SHORT COMMUNICATIONS

Selective mortality of stag beetles in Orpington, Kent. – In Britain, the European stag beetle *Lucanus cervus* L. (Lucanidae) has traditionally been associated with broad-leaved woodland areas, however, two recent national surveys (Percy *et al.*, 2000; Smith, 2003) have demonstrated its strong presence in urban and suburban areas of south-east England where this nationally scarce species appeared to be fairly common. The Borough of Bromley in Greater London is one of those population hotspots.

I started collecting data on dead stag beetles in Orpington in June 2004 when a fellow commuter deliberately crushed one in front of me. All dead specimens and body parts were collected daily between June and August 2004. Approximately 30% of the patrolled route is made of public footpaths covered in tarmac and running between back gardens or crossing a park (Fig.1). Adult beetles are allegedly attracted to the warm surfaces of tarmac and pavements (London Biodiversity Partnership, 2000). Records (both live and dead) of stag beetle and lesser stag beetle *Dorcus parallelipipedus* L. are marked on the map. There were two clear zones (A and B, Fig. 1) with high concentrations of stag beetles separated by the most urbanised part of Orpington (zone C, Fig.1). Zone A is mainly houses with large gardens and small patches of broadleaved trees. The public footpaths run between back gardens and are partly lined with edges containing dead wood. This part of Orpington contained small woodland areas and orchards in the 19th century (Taylor, 1995). Zone A is probably much larger including the three isolated specimens found further north-east. The second zone includes part of a large park, a cemetery, small patches of broadleaved trees and a lane lined with edges containing clear oviposition sites. A high concentration of dead and live specimens was observed near a pile of decaying wood. The major changes in this area since the 19th century are the addition of a large road (Orpington bypass) and housing developments on fields (Taylor, 1995).

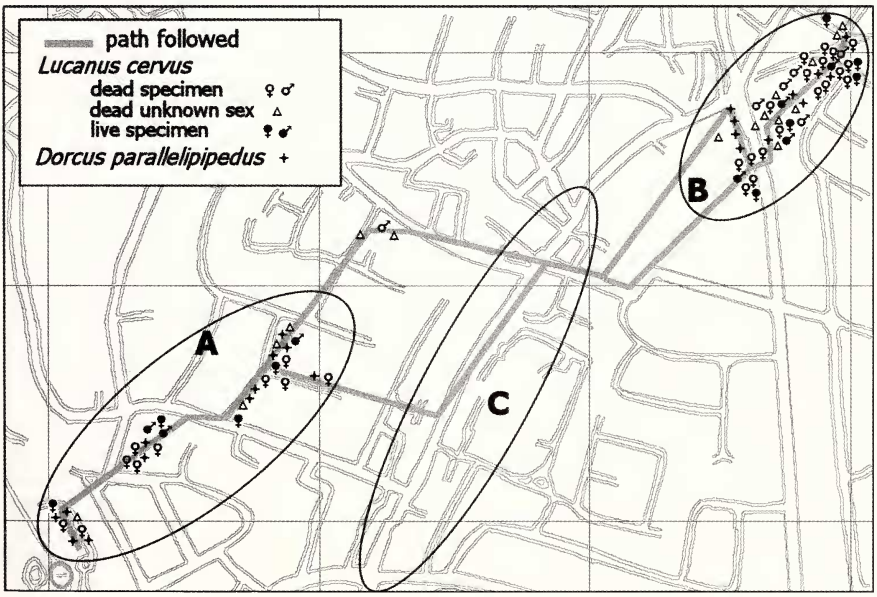

Fig. 1. Distribution map of *Lucanus cervus* and *Dorcus parallelipipadus* in Orpington, Kent. Zone C represents the only part of the town centre which can be classified as urban.

A total of 49 specimens was collected, including 19 thought to have been killed by pedestrians (19 ♀) and 23 by natural predators (4 ♀, 3 ♂, 16 non-identifiable). Secondary predation by black ants was observed in nine cases. Specimens which appeared to have been crushed by pedestrians were complete or nearly complete, usually with a broken pronotum and commonly had their reproductive organs outside their abdomen. Stag beetles killed by natural predators were incomplete, usually a single part of the body (elytron, leg) or different parts found in close proximity. Some specimens had clear evidence of tooth marks. A further six specimens (3 ♀, 3 ♂) were complete with no apparent signs of crushing and possibly died of natural causes. One incomplete female specimen apparently crushed by a pedestrian was probably first killed by a predator. In total, 25 complete or nearly complete specimens (3 ♂, 22 ♀) were collected. Sizes were in accordance with the literature (Harvey & Gange, 2003) with a median size of 33.8 mm (range 31–38 mm) for males and 36.3 mm (range 25–45 mm) for females. The smallest female was smaller than the largest male lesser stag beetle (29 mm including mandibles). This illustrates the identification problems encountered during the national stag beetles survey where smaller female *L. cervus* and large *D. parallelipipedus* might be confused by the general public.

All the specimens assumed crushed by pedestrians were female. This fact could have three origins (or be a combination of the three): a bias in the collected data, the beetle's sex ratio and/or difference of behaviour between the sexes or the behaviour of the offender. The study is based on a small population size and the difference could be due to a sampling bias. It is hard to exclude this fact, but males were present in all the other sampled populations. However, this is just anecdotal evidence and not a solid proof.

The difference could be solely due to a higher proportion of females or a difference of behaviour between males and females. Such a difference in sex ratio in an area with an established population can be safely excluded: during the same period over 50% of stag beetles observed during the 2002 national stag beetle survey were males (Smith, 2003). However, if the females were to be found far more commonly on the ground than males (especially on tarmac areas) this might explain the difference. There is no indication in the 1998 and 2002 surveys to back-up this assumption. Furthermore, during this study seven out of 16 live *L. cervus* observed on the ground were males and six out of 14 of the identifiable *L. cervus* collected (excluding obvious death by crushing) were males. Finally, in *D. parallelipipedus*, where it is harder for members of the general public to differentiate between sexes, eight out of 13 of the crushed specimens were males.

Finally, the difference could be explained by human behaviour: pedestrians might be more likely to kill female stag beetles. Such a statement seems blunt, but one could develop different theories to explain this. People might, for example, recognise male stag beetles but not females and therefore make a conscious effort of avoiding males but not females. An alternative theory, proposed by one of my colleagues, is that people probably do not recognise either but will not go near male stag beetles because of their more "fearsome" look.

To test this hypothesis, a small survey of the local residents and people using those public footpaths was carried out with the help of my wife. The main aim of the questionnaire was to establish if people could recognise male stag beetles more readily. It included questions about their perception of stag beetles (national and local distribution) and details on if and where they had seen a stag beetle. They were then asked to identify *L. cervus* from fifteen drawings of insects (mainly Coleoptera). The overwhelming majority (93%) of the 104 persons who answered "knew" what a stag beetle was and "had seen" (77%) a stag beetle (72% a live specimen, 28% a dead one, a third of the sightings occurred this year, over 80% in an urban or suburban

environment). Interestingly, people did not know the sex of the specimen in the majority of cases (69%). When asked to identify *L. cervus*, male stag beetles were the most common answer but represented by less than a third of the total answers (29%) but it was nearly three times more often than the females (11%). The two most incorrect answers were the cockchafer *Melolontha melolontha* (L.) and the rose chafer *Cetonia aurata* (L.) (18% each), while *D. parallelipipedus* was chosen in 8% of the cases. Nearly 50% thought that stag beetles were common in England (25% had no idea), and none considered it endangered or protected. In terms of local distribution 60% had no idea, 20% thought the species was rare and 20% common. However, the results of such a small public survey should not be considered as concrete evidence that the females are more targeted than the males.

It is hard to assess the overall effect of pedestrians on urban population of stag beetles. Other human activities such as cars or even grass mowing equipments (Jones, 2001) are known to kill stag beetles; and there is little doubt that the biggest damage is done through the destruction of suitable habitats. Unlike cars or machinery, this loss of beetles could easily be reduced through education leading to a better recognition of the species. – MARC E. MIQUEL, 7 Albert Road, St Mary Cray, Orpington BR5 4AF. (marc.miquel@kcl.ac.uk)

REFERENCES

Harvey D. & Gange A. 2003. Presentation on size variation in the stag beetle. *Proceedings of the second pan-European conference on saproxylic beetles*. London, People's Trust for Endangered Species.

Jones R. A. 2001. Grass-mowing machinery, an important cause of stag beetle mortality in a south London park. *British Journal of Entomology and Natural History* **14**: 221–223.

London Biodiversity Partnership 2000. *Species action plan: stag beetle*. London Wildlife Trust http://www.lbp.org.uk/03action_pdfs/ac20_stagbeetle.pdf

Percy C., Bassford, G. & Keeble, V. 2000. *Stag Beetles. Findings of the 1998 National Stag Beetle Survey*. London, People's Trust for Endangered Species.

Smith M. N. 2003. *National Stag Beetle Survey 2002*. London, People's Trust for Endangered Species.

Taylor P. 1995. *Old Ordnance Survey Maps – Orpington 1868*. Alan Godfrey Maps, Gateshead.

The recent occurrence of *Sturmia bella* (Meigen) (Diptera: Tachinidae) in south-west England, including rearings from two host species of Nymphalidae. – In late summer 2003 I reared five examples of a tachinid fly which I could not identify using the Royal Entomological Society key of Belshaw (1993). I sent two specimens (♀, ♂) to the Natural History Museum whereupon Nigel Wyatt determined them as *Sturmia bella* (Meigen). These two examples are now in the Natural History Museum collection. This parasitoid fly was first recorded from the UK from Hampshire in July 1998, a male being reared from a pupa of *Inachis io* (L.) (Ford *et al.*, 2000).

Collection details: six larvae of *Aglais urticae* (L.) (Nymphalidae) were collected on 3.viii.2003 in a field amongst farmland, Dawlish, Devon (SX 9577). One of these produced two ♂♂ *bella* adults early ix.2003; a second individual (as a pupa) gave one ♀ *bella*, also early ix.2003.

Seven larvae of *Polygonia c-album* (L.) (Nymphalidae) were collected on 25.viii.2003 from *Ulmus* on a cliff-top path, Dawlish (SX 9777). One of these gave, from the pupa, two larvae of *S. bella* (tachinid larvae appearing 29 and 30.viii), with two adults (♀♂) hatching on 12.ix.2003.

The next encounter with *S. bella* occurred on 24.vii.2004, when I captured three ♂♂ on flowers of *Pastinaca sativa* (L.) (Wild Parsnip) at Studland, Dorset.